

Claims

1. A fuel injection valve for internal combustion engines, having a valve body
5 (1) in which a bore (3) is embodied that is defined on its end toward the
combustion chamber by a valve seat (18) at which at least one injection opening
(20) originates, and having a hollow valve needle (8), which is located
longitudinally displaceably in the bore and which has a valve sealing face (35) on
its end oriented toward the valve seat (18), characterized in that a first sealing
10 region (31; 34) and a second sealing region (32; 46; 48) are embodied on the
valve sealing face (35), and the hollow valve needle (8) cooperates with the valve
seat (18) in such a way that upon contact of the hollow valve needle (8) with the
valve seat (18), the first sealing region (31; 34) upstream of the at least one
injection opening (20) and the second sealing region (32; 46; 48) downstream of
15 that injection opening effect sealing between the valve sealing face (35) and the
valve seat (18).

2. The fuel injection valve according to claim 1, characterized in that the first
sealing region (31; 34) is embodied as a conical face (31), which upon contact of
20 the hollow valve needle (8) with the valve seat (18) rests flatly thereon.

3. The fuel injection valve according to claim 1 or 2, characterized in that
downstream of the conical face (31), a concave feature (50) is provided on the
hollow valve needle (8), forming a sealing lip (52) on which the second sealing
25 region (48) is embodied, and the sealing lip (52) is deformable elastically inward.

4. The fuel injection valve according to claim 1, characterized in that the
second sealing region (31; 34) is embodied as a conical face (32), which upon
contact of the hollow valve needle (8) with the valve seat (18) rests flatly thereon.

5. The fuel injection valve according to claim 1, characterized in that an annular groove (37) extending all the way around is embodied on the valve sealing face (35) between the first sealing region (31; 34) and the second sealing region (32; 46).

6. The fuel injection valve according to claim 6, characterized in that the annular groove (37) covers the at least one injection opening (20).

7. The fuel injection valve according to claim 6, characterized in that the first sealing region (45) is formed by the upstream edge (45) of the annular groove (37), which forms the boundary line between a first conical face (30) and the annular groove (37).

8. The fuel injection valve according to claim 6, characterized in that the second sealing region (32; 46; 48) is formed by an edge (46) which is embodied at the transition from the annular groove (37) to the part of the valve sealing face (35) located downstream of the annular groove (37).

9. The fuel injection valve according to claim 8, characterized in that the part of the valve sealing face (35) located downstream of the annular groove (37) is embodied as a convex end portion (39).

10. The fuel injection valve according to claim 1, characterized in that the valve sealing face (35) has a first conical face (30), a second conical face (31) located downstream of the first conical face (30), and a third conical face (32) located downstream of the second conical face (31).

11. The fuel injection valve according to claim 10, characterized in that the first

conical face (30) has a smaller opening angle than the second conical face (31), so that at the boundary line between the conical faces (30; 31), the first sealing region is embodied as an edge (34) extending all the way around.

5 12. The fuel injection valve according to claim 10, characterized in that the third conical face (32) has a larger opening angle than the conical valve seat (18).

13. The fuel injection valve according to claim 10, characterized in that an annular groove (37) that covers the injection openings (20) is formed between the
10 second conical face (31) and the third conical face (32).

14. The fuel injection valve according to claim 1, characterized in that the valve sealing face (35) includes a first conical face (30), an upper conical face (31a) located downstream of the first conical face (30), a lower conical face (31b)
15 located downstream of the upper one, and a third conical face (32) located downstream of that, the first sealing region being formed by the edge (45) between the first conical face (30) and the upper conical face (31a) and the second sealing region being formed between the lower conical face (31b) and the third conical face (32).

20 15. The fuel injection valve according to one of claims 1 through 14, characterized in that the second sealing region (32; 46; 48) comes to rest on the valve seat (18) before the first sealing region (31; 34), upon the motion of the hollow valve needle (8) toward the valve seat (18).

25 16. The fuel injection valve according to one of claims 1 through 15, characterized in that a valve needle (10) is located longitudinally displaceably in the hollow valve needle (8) and controls the opening of at least one further injection opening (22), which originates at the valve seat (18).

17. An internal combustion engine having at least one combustion chamber and at least one fuel injection valve through which fuel can be injected into the combustion chamber, characterized in that the fuel injection valve is embodied in

5 accordance with one of claims 1 through 16.